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ABSTRACT

From 1990 to 1992, 13,065 secondary students in selected midwestern school districts filled out questionnaires asking for information on their use of alcohol, tobacco, marijuana, and cocaine. The questionnaires also requested information on the following variables: the student's involvement in activities in and out of school, employment, church attendance, and whether the student came from a two-parent, parent/step-parent, or single-parent family. Earlier research had indicated a relationship between some of these factors and substance use, and also indicated that adolescent substance users tend to move from alcohol to tobacco to marijuana to hard drugs. Of the questionnaires returned, 12,576 were usable, and cluster analysis and correspondence analysis were used to assess the data obtained. For each type of substance use, the results indicated that the highest users tended to: be employed, live in a single-parent or step-parent household, be uninvolved in activities, and be least likely to attend church. Lowest users showed the opposite pattern, tending toward unemployment, two-parent family situations, participation in multiple activities, and regular churchgoing. Results also supported the theory that student drug users tend to move from using alcohol to tobacco, from tobacco to marijuana, and from marijuana to cocaine. For secondary-school substance users, holding a job may preclude after-school activities, as well as providing a source of income for tobacco, alcohol, or illegal drugs. (CC)

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ED 369 010

A STUDY TO EXPLORE THE INTER-RELATIONSHIPS AMONG FACTORS AFFECTING SUBSTANCE ABUSE OF SECONDARY SCHOOL STUDENTS

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The objective of this paper was to examine the inter-relationships among the variables of substance abuse, employment, family environment, participation in school activities, participation in out-of-school activities, and church attendance for secondary students in selected midwestern suburban/rural school districts. The students were surveyed during the 1990-91 and 1991-92 academic years. The instrument used was a 52 item questionnaire eliciting information relative to the various controlled substances, tobacco and alcohol, home environment, participation in activities, employment, and religious involvement. A total of 13,065 students were surveyed over this two year period.

Substance use examined for this study included tobacco, alcohol, marijuana and cocaine. The responses for items concerning the use of each of these substances were recoded as follows: '0'--never used; '1'--experimented with or used and quit; '2'--currently use. While the original questionnaire requested responses for frequency of use, it was decided to classify all students who use a substance within one category whether they use the substance daily, once a week, or occasionally.

Employment consisted of after school or week-end employment during the school year but not summer employment. This variable was coded simply as '0' not employed or '1' employed.

Family environment was recoded from the questionnaire as: '0'--home with both parents present; '1'--home with parent and step-parent; or '2'--single parent home or other home environment.

Participation in activities in school and participation in activities outside the school were recoded as follows: '0'--no participation; '1'--participation in organized athletics; '2'--participation in clubs; '3'-- participation in music or drama organizations; and '4'--participation in multiple activities. Participation in student government in the school was classified with participation in clubs and thus coded as '2'.

The item on religious involvement was coded as: '0'--attend church regularly; '1'--attend church often; '2'--seldom attend church; and '3'--never attend church. This was considered as a different variable than participation in activities outside the school, although some of the activities may include such things as a church athletic league or church drama organization.

Earlier research by the investigators [7] indicated a relationship between use of each of these substances and employment. Contingency tables were constructed between each substance variable and employment. Using the chi-square statistic, a significant relationship was found between substance use and employment for each of the substances surveyed. This research indicated that the students who were employed were more inclined to use substances than those who were not employed.

Further research by the investigators [6] found a definite relationship between substance use and the family environment. Again, setting up a contingency table and using the chi-square statistic, it was found that students from a home with both parents present were less disposed to use of substances than students from a parent/step-parent family environment; and students from parent/step-parent families were much less inclined to substance use than students living in a single parent home.

This finding was supported by Needle, et al. who concluded that an adolescent divorce group was found to have greater overall drug involvement than those who did not come from a home where there had been a divorce. [4] This same conclusion was reached by Flewelling, et al. who reported higher levels of usage for children of non-intact families [2]. Webb, et al. found rejection of parental authority as an important risk factor related to alcohol use among early adolescents. [8]

The investigators also determined a significant relationship between participation in activities, both in-school and out-of-school, and substance use. Generally, students who did not participate in activities were more prone to use substances than those who were active. [6] Research by Iso-Ahola et al. confirmed the findings by the investigators. This research concluded if "leisure activities fail to satisfy their [adolescents] need for optimal arousal, leisure boredom results and drug use may be the only alternative. [3]

Follow-up research [5] using log-linear models indicated a significant relationship between each variable and substance use when the effect of the remaining variables was removed. However, the relationships between the variables other than substance use were not explored. Examining the inter-relationship among the variables of employment, family environment, and activity participation might present a profile for students engaged in the use of each of the substances.

Research by Andrews et al. indicated a sequence of sub-stance use from alcohol to cigarettes to marijuana and finally to hard drugs. [1] This research was the basis for separately analyzing alcohol use, tobacco use, marijuana use and then cocaine use. This research also implied the pattern of the relationship among the variables should be somewhat similar for each substance.

Procedures

To explore the inter-relationship among the variables, two statistical techniques were utilized in this study: cluster analysis and correspondence analysis. The cluster analysis was used to see if different levels of different variables would tend to form clusters, and the correspondence analysis was used to gain an understanding of the proximity of the levels of the different variables to one another. In order to perform the cluster analysis, use was made of the QUICK CLUSTER procedure from SPSS release 4.1 for the VAX/VMS running under VMS 5.5 on a VAX computer. The correspondence analysis was performed using the CA (correspondence analysis) procedure of the BMDP statistical package, version 1990, for the VAX/VMS.

Of the 13,065 students surveyed, 12,567 questionnaires were usable. Given in Table 1 are the response frequencies and percentages for the variables considered in the study.

The research reported by Andrews seems to be confirmed by the results of this study. When correspondence analysis was applied to the substance variables, a hierarchy of substances could be determined. The plot of the first two axes appears in Figure 1. These plots and the co-ordinates determined for the first two dimensions describe about 50% of the inertia of the system.

Notice that the upper right quadrant consists of subjects who reported never using any of the substances, with the exception of cocaine. However, the point representing the non-users of cocaine is very close to this quadrant and is of a greater distance from points in other quadrants. Below the horizontal axis are those who experimented with tobacco, alcohol, or marijuana or used the substances in the past, but have quit using the substances. The subjects who currently are using the substances, with the exception of cocaine, are represented in the upper left quadrant.

The projection of the points represented in Figure 1 on one axis is illustrated in Figure 2.

In Figure 2, the only point out of line is that representing those who experimented with cocaine, or used cocaine in the past but quit. The results, however, are consistent with Andrews' research cited earlier. The non-users of all substances are quite close together, as are those who have experimented with or quit using alcohol or tobacco. Grouped closely together at the negative end of the axis are those users of marijuana or cocaine, with the alcohol users and tobacco users a short distance above.

When the cluster analysis was performed, a decision was made to require the number of cases in each cluster to be at least 1,000. This would represent close to 10% of the cases. The results of the correspondence analysis applied to the substance variables indicated that 82% of the inertia could be accounted for with five dimensions. The number of clusters that met this criteria for all substances was five. An initial analysis was made to determine initial cluster centers. These centers were then used as initial centers for a second run. The final cluster centers were the result of the second analysis. Information on the use of the substances of tobacco, alcohol, marijuana, and cocaine was then individually combined with the variables of employment, family environment, participation in school activities, participation in after-school activities and religious involvement.

Table 1
Descriptive Information

Variable	Category	Frequency	Percent
Employment	No	7,594	60.4
	Yes	4,973	39.6
Family Env.	Both Parents	9,049	72.0
	Parents Step	1,617	12.9
	Single Parent	1,901	15.1
Sch Act.	None	3,588	28.6
	Athletics	3,051	24.3
	Clubs	828	6.6
	Music/Drama	1,670	13.3
	Multiple Act.	3,430	27.3
After Sch.	None	3,916	31.2
	Athletics	4,045	32.2
	Clubs	1,044	8.3
	Music /Drama	1,032	8.2
	Multiple Act.	2,530	20.1
Church Att.	Regular	4,816	38.3
	Some	3,253	25.9
	Seldom	2,733	21.7
	Never	1,765	14.0
Tobacco	Not Used	7,211	57.4
	Used-Quit	3,058	24.3
	Use	2,298	18.3
Alcohol	Not Used	5,716	45.5
	Used-Quit	4,539	36.1
	Use	2,312	18.4
Marijuana	Not Used	10,445	83.1
	Used-Quit	1,491	11.9
	Use	631	5.0
Cocaine	Not Used	12,134	96.6
	Used-Quit	82	0.7
	Use	351	2.8

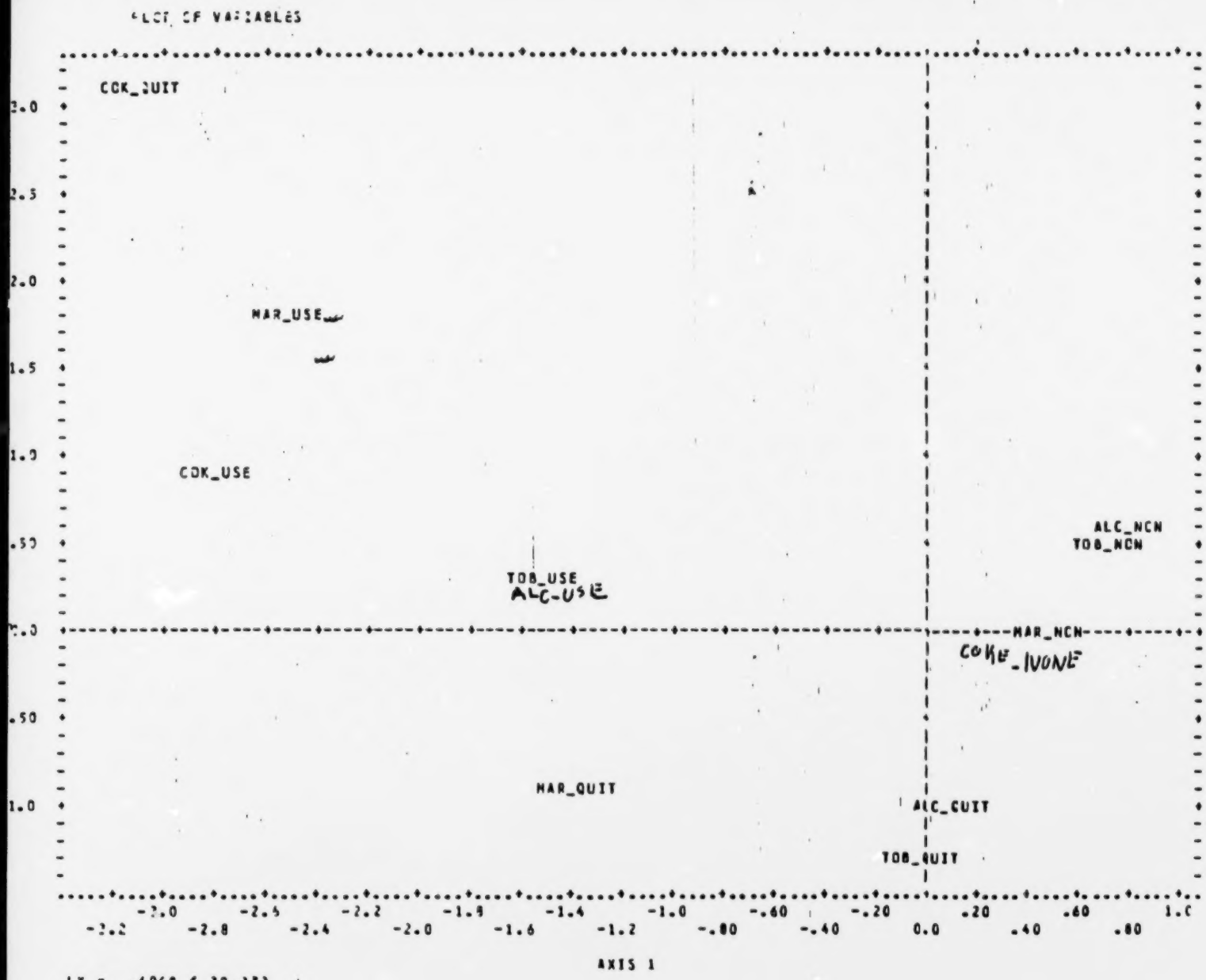

Figure 1

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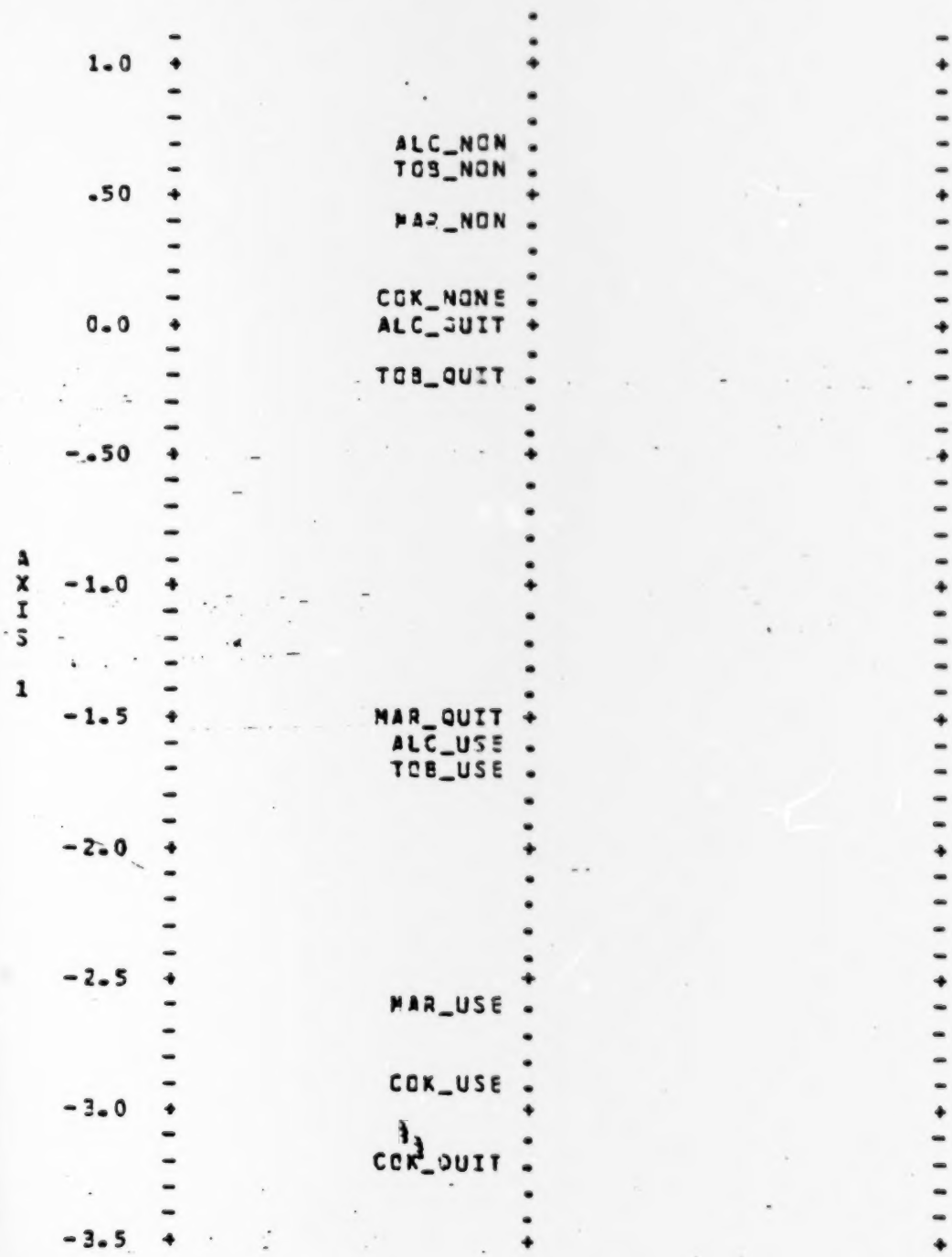
PLOT OF VARIABLES



LX = .6068 (30.3%)

9.

Figure 2

The centers of the clusters obtained when tobacco was analyzed with the other variables are presented in Table 2.

Table 2
Cluster Centers for Tobacco

Variable	Cluster				
	1	2	3	4	5
Tobacco	.6504	.4304	.9994	.5015	.5145
Employment	.4271	.3846	.4418	.3673	.3837
Family Env	.4197	.3273	.6947	.3836	.3293
School Act	.6061	3.6379	.5002	3.6594	.7179
After-Sch.	3.7113	3.7036	.4676	.7835	.7885
Religious	1.0858	.7814	2.3033	1.0033	.3948
Total N of cases	1,084	2,530	3,135	2,698	3,328

Cluster 3 represents the highest users of tobacco. (0--no-user; 1--experimented with/used but quit; 2--currently use) This cluster also represents those who are more likely to be employed (0--not employed; 1--employed) are furthest from a home environment with both parents present (0--both parents present; 1--parent/step-parent; 2--single parent), least involved in activities (0--no involvement; 1--athletics; 2--government/clubs; 3--music/drama 4--multiple activities); and least involved in religion (0--attend church regularly; 1--attend sometimes; 2--attend seldom; 3--never attend).

Cluster 2 represents an opposite pattern. These are the respondents least likely to use tobacco, tend toward not being employed, are closest to a two family home environment, participate in multiple activities, and tend toward church attendance.

Cluster 1 represents the second highest users of tobacco group. It is noteworthy that members of this group also are more likely to be employed and tend more toward a family environment that does not include both parents. However, they show a favorable participation in after-school activities.

Clusters 4 and 5 seem to represent a middle ground. Earlier research by the investigators [5] indicated those who participated in music or drama activities outside the school environment tended to use tobacco. This may be reflected in Cluster 1. Furthermore, this same study indicated that students who participated in athletics within the school environment, or school sponsored clubs or government had a tendency toward tobacco use. This may account for Cluster 4.

The results displayed in Table 3 show the greatest distance exists between Cluster 2, representing those least likely to use tobacco, and Cluster 3, representing those most likely to use tobacco.

Table 3
Distance Between Cluster Centers for Tobacco

Cluster	2	3	4	5
1	3.0567	3.4946	4.2341	3.0094
2		4.8057	2.9300	4.1434
3			3.4815	2.0377
4				3.0019

These clusters seem to be supported by applying correspondence analysis to these results. Note that the upper right hand quadrant in Figure 3 seems to represent Cluster 2. The tendency toward tobacco use is closest to employment and the single parent family or parent/step-parent family environment. The two axes displayed accounted for about 20% of the inertia.

Projecting these results on axis 1 produced the results shown in Figure 4. This illustrates very clearly that non-users of tobacco are closest to home environments where both parents are present, who are not employed, and who are participating in activities. In the vicinity of the point representing tobacco use are the students who are employed, come from single family or parent/step-parent family homes, and who are not participating in either school or after-school activities.

The cluster pattern for alcohol use was very similar to that for tobacco use. This is not surprising, as the points for alcohol and tobacco were quite close to each other as seen in Figure 2. The centers for the five clusters for alcohol are displayed in Table 4.

If one re-labels column 1 as Cluster 4, re-labels column 4 as Cluster 5, and re-labels column 5 as Cluster 1, the pattern of cluster centers for alcohol is almost the same as that for tobacco. It is again noteworthy that Cluster 2 is representative of those who are least involved in alcohol use, least likely to be employed, most likely to come from a home environment where both parents are present, most likely to participate in activities, and are more likely to be involved in a church. Cluster 3 is representative of those who are most likely to use alcohol. The pattern is the opposite of that found in Cluster 2.

Table 4
Cluster Centers for Alcohol

Variable	Cluster				
	1	2	3	4	5
Alcohol	.6704	.6004	.9875	.6413	.7683
Employment	.3664	.3837	.4342	.3857	.4368
Family Env.	.3859	.3250	.6990	.3162	.4112
School Act.	3.6712	3.6383	.5163	.7084	.6264
After Sch.	.7800	3.7028	.4768	.7788	3.6905
Religious	.9891	.7798	2.3188	.4086	1.0980
Total N of Cases	2,664	2,520	3,933	3.368	1,092

As one would expect, the distance between the centers for Cluster 2 and Cluster 3 is the greatest. The distances between cluster centers for alcohol is shown in Table 5.

Table 5
Distance Between Cluster Centers for Alcohol

Cluster	2	3	4	5
1	2.9322	3.4565	3.0202	4.2151
2		4.7764	4.1560	3.0349
3			2.0115	3.4585
4				2.9979

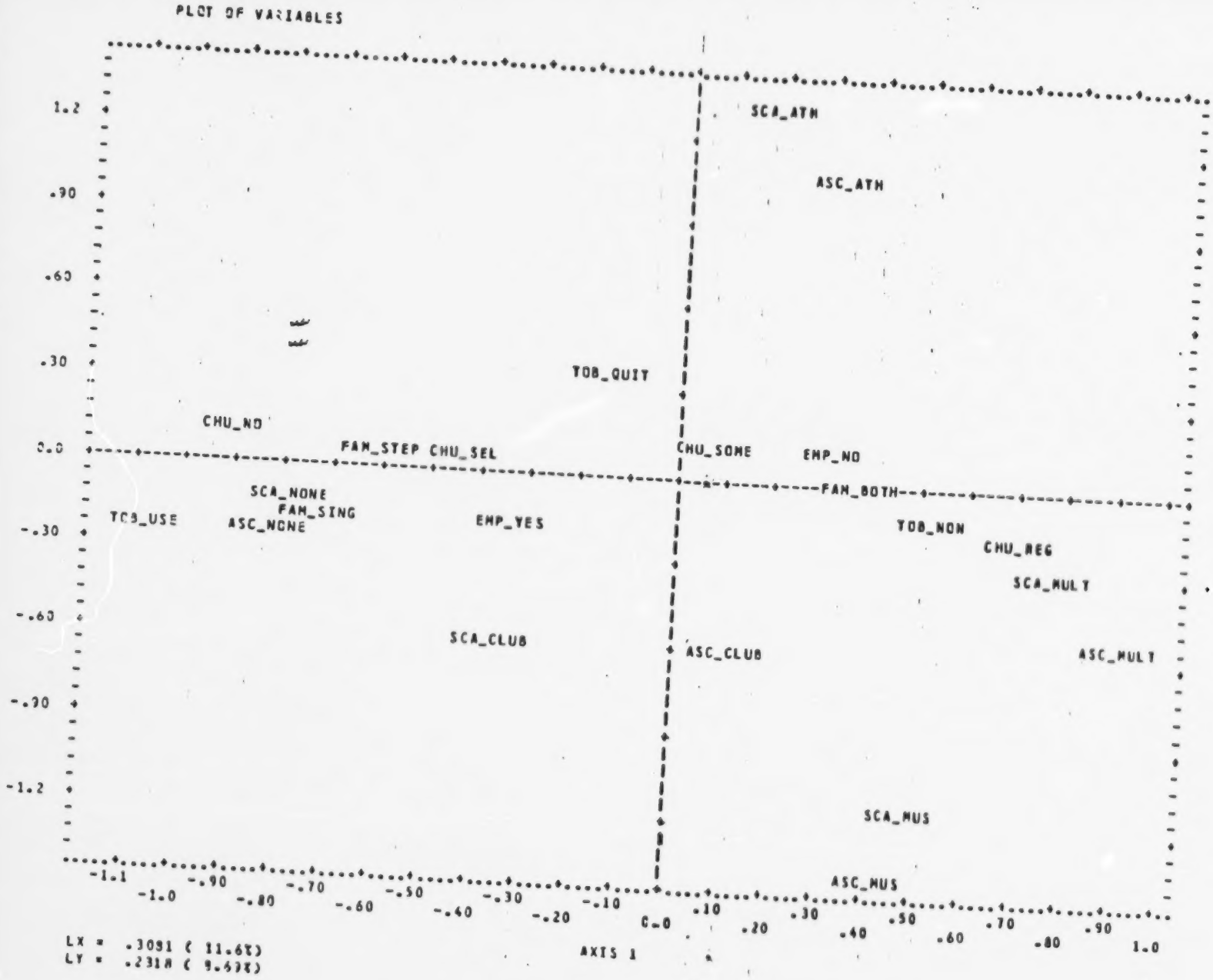


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Figure 3

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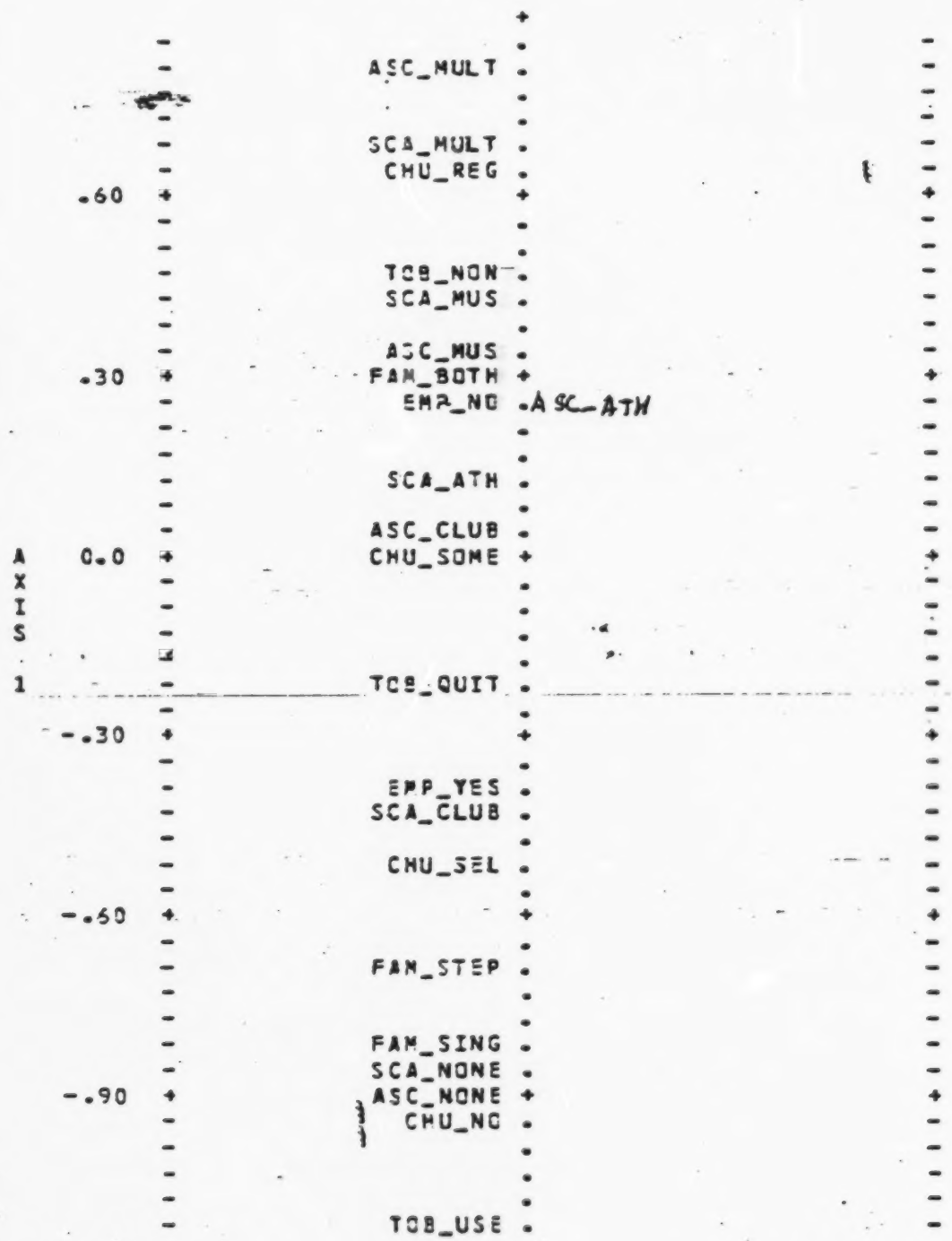
PLOT OF VARIABLES



LX = .3091 (11.6%)

Figure 4

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The plot of the first two axes resulting from the correspondence analysis was applied to alcohol and the other non-substance variables is shown in Figure 5. About the same amount of inertia (20%) as found for tobacco, was accounted for by two dimensions. The placement of the points is similar.

When these results are projected on axis 1, points representing respondents from home environments where both parents are present, respondents who are not employed, and who participate in activities are in close proximity as are points representing respondents who use alcohol, come from single parent home environments and are not participating in activities. Figure 6 illustrates this result.

The results for clustering marijuana with the other variables is similar to the clusters with these other variables obtained for tobacco and alcohol. The cluster centers for marijuana are displayed in Table 6.

Table 6
Cluster Centers for Marijuana

Variable	Cluster				
	1	2	3	4	5
Marijuana	0.1356	0.1357	0.1819	0.4190	0.2608
Employment	0.3754	0.3833	0.3923	0.4240	0.4238
Family Env.	0.3854	0.3274	0.4142	0.6098	0.3987
School Act.	3.6214	3.6706	0.6421	0.5493	0.6774
After-Sch.	0.8090	3.7018	0.7099	0.5140	3.7276
Religious	0.9872	0.7966	0.4382	2.4417	1.0251
Total N of Cases	2,744	2,468	3,551	2,778	1,116

Cluster 2 represents those least likely to use marijuana, while Cluster 4 represents those most likely to be involved with marijuana. The respondents represented by Cluster 2 were least likely to be employed, most likely to come from a family environment with both parents in the home, and most likely to participate in activities in and outside school. Cluster 4 has the same pattern for marijuana that Cluster 3 has for alcohol. Clusters 1 and 5 have the same pattern for both the substances of alcohol and marijuana. Thus, the relationship holds for the three substances of tobacco, alcohol and marijuana.

Displayed in Table 7 are the distances between the centers for the five clusters obtained when analyzing marijuana with the non-substance variables. As expected, the greatest distance is between Cluster 2 and Cluster 4.

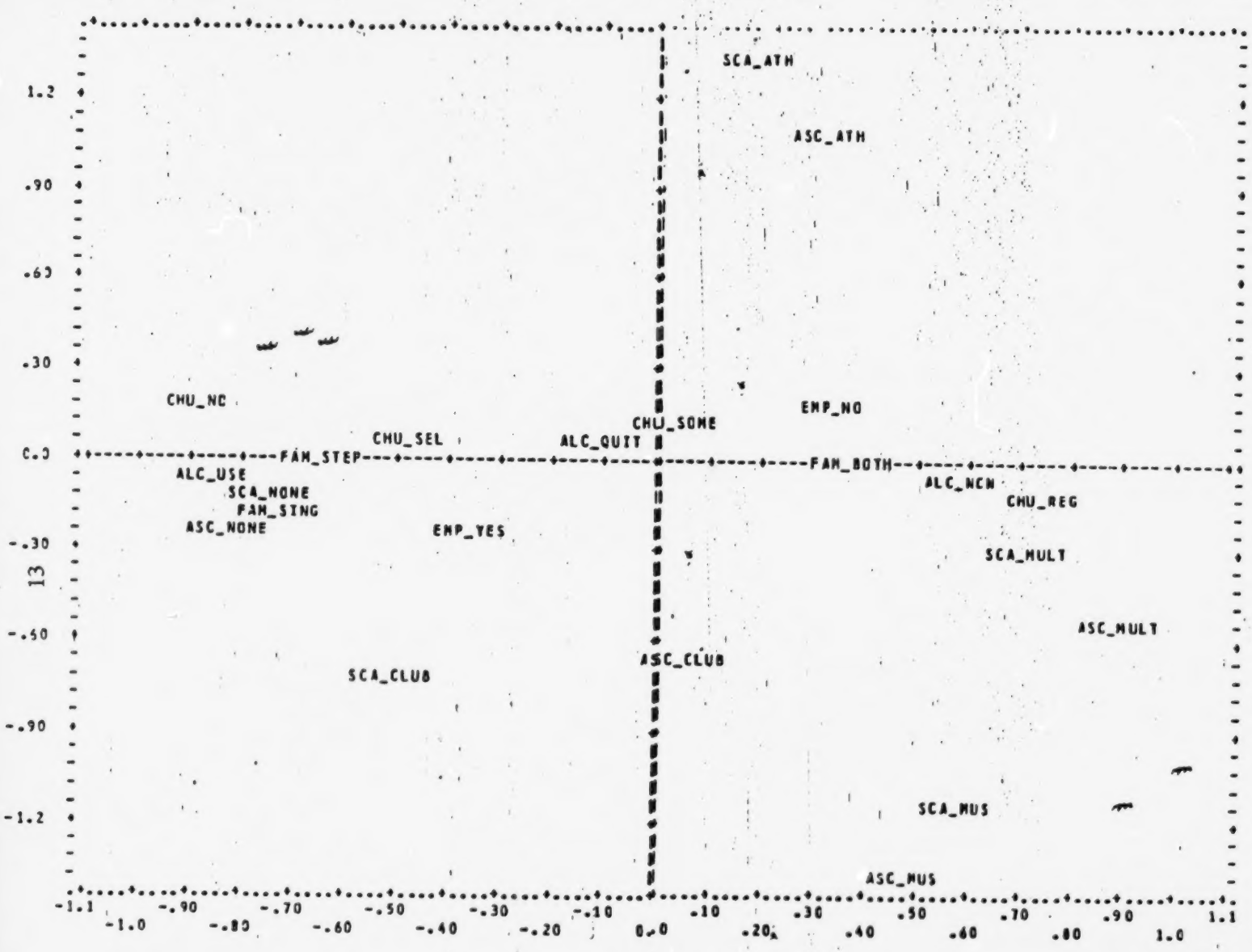

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Figure 5

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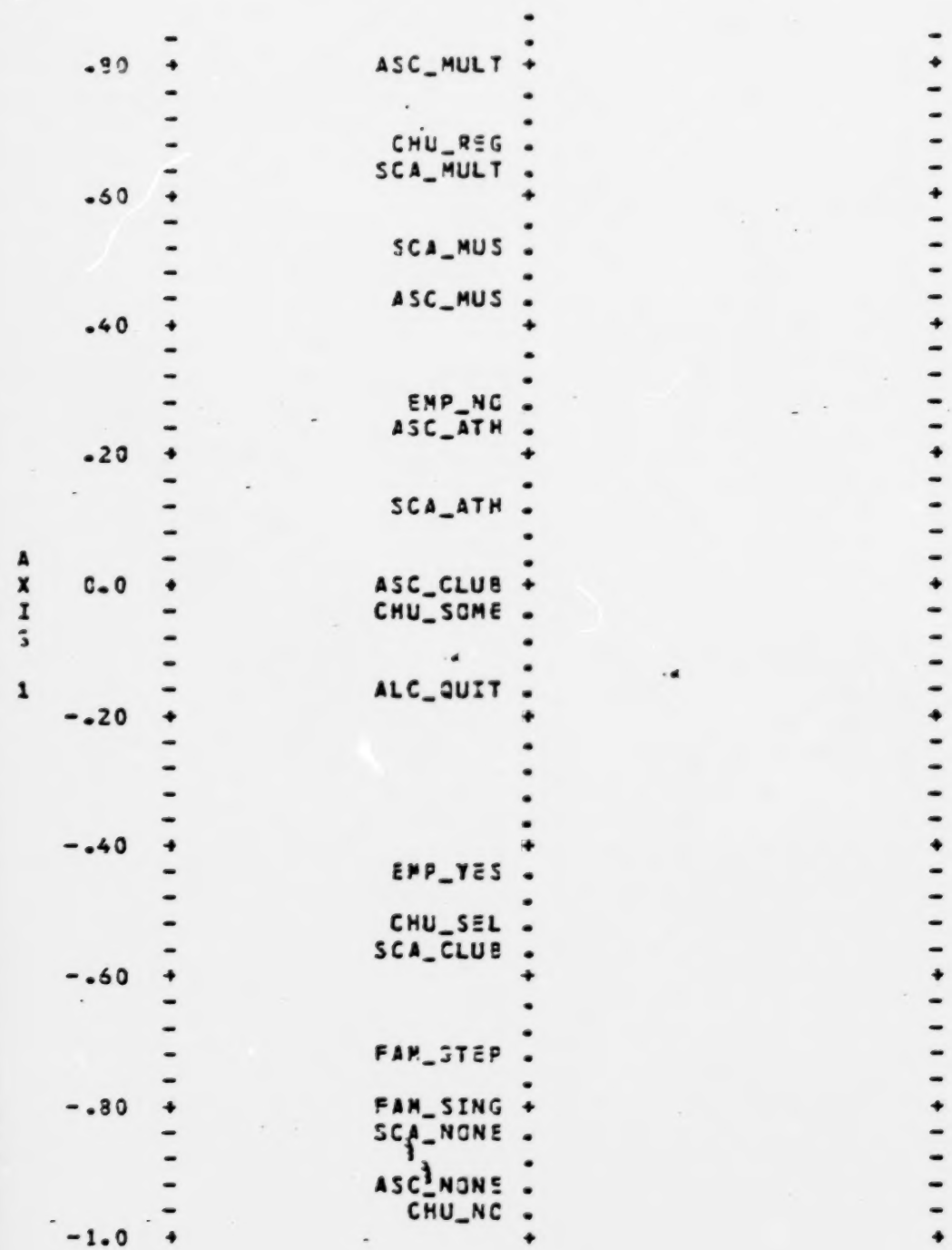
PLOT OF VARIABLES



LX = .2978 (11.2%)

Figure 6

Table 7
Distance Between Cluster Centers for Marijuana

Cluster	2	3	4	5
1	2.9000	3.0316	3.4312	4.1478
2		4.2733	4.7720	3.0057
3			2.0387	3.0756
4				3.5242

The correspondence analysis displays a similar plot for two axes for marijuana use as was the case for alcohol and tobacco use. As can be observed from the two axes plotted in Figure 7, the point representing respondents who do not use marijuana is closest to the point representing respondents who are not employed, and to the point representing respondents who come from a home with both parents present. The points representing the users of marijuana, or those who experimented or used and quit are close to the points representing those who are employed, who come from a single parent or parent/step-parent home environment, and who do not participate in activities. As before, these two axes represent about 20% of the inertia.

Projecting these points on one axis is illustrated by the plot in Figure 8. Again, the points representing those who use marijuana, or have experimented with or quit using marijuana are on the negative end of the scale. One may observe that the pattern for marijuana follows the same pattern for alcohol and tobacco.

The results for cocaine differ somewhat from the results for the other substances. This may be that of the responses, 96.6% indicate that there has been no cocaine use, while .7% report having experimented with cocaine and quit, but 2.8% report current use of the substance. For the other substances, a higher percentage reported that they experimented with the substance or used the substance and subsequently quit. The cluster centers for cocaine are displayed in Table 8.

The cluster representing the respondents most likely to use cocaine is Cluster 4. This cluster shows the same pattern as the cluster representing the most likely users of the other substances. However, Cluster 2 has the pattern that is expected for those least likely to be involved in alcohol or tobacco use. For cocaine, however, Cluster 1 has the value closest to non-use of the substance. As indicated earlier, these values may reflect the fact that there was a higher percentage of respondents that reported cocaine use than reported that they had only experimented with cocaine, or had used cocaine and quit.

The distances between the centers of the clusters are given in Table 9. The greatest distance, however, is between Clusters 2 and 4. This is consistent with the distances between centers of clusters for the other substances.

Table 8
Cluster Centers for Cocaine

Variable	Cluster				
	1	2	3	4	5
Cocaine	0.0255	0.0325	0.0316	0.0919	0.0663
Employment	0.3679	0.3815	0.3975	0.4300	0.4276
Family Env.	0.3867	0.3279	0.4159	0.6099	0.4055
School Act.	3.6737	3.6721	0.6718	0.5525	0.6670
After-School	0.7744	3.7025	0.7323	0.5187	3.7173
Religious	0.9914	0.7950	0.4511	2.4446	1.0345
Total N of Cases	2,669	2,464	3,638	2,807	1,132

Table 9
Distance Between Cluster Centers for Cocaine

Cluster	2	3	4	5
1	2.9353	3.0507	3.4607	4.2081
2		4.2368	4.7618	3.0162
3			2.0190	3.0419
4				3.5036

The correspondence analysis produced the display shown in Figure 9. These two axes accounted for 19.3% of the inertia. Again, the plot appears much the same as the plots for the other substances.

When the result is projected onto one axis, the arrangement again mimics the other substances. It is interesting to note that cocaine use falls where one would expect and does not change positions with the point representing those who experimented with cocaine or used cocaine in the past but quit. This projection of the result onto one axis is shown in Figure 10.

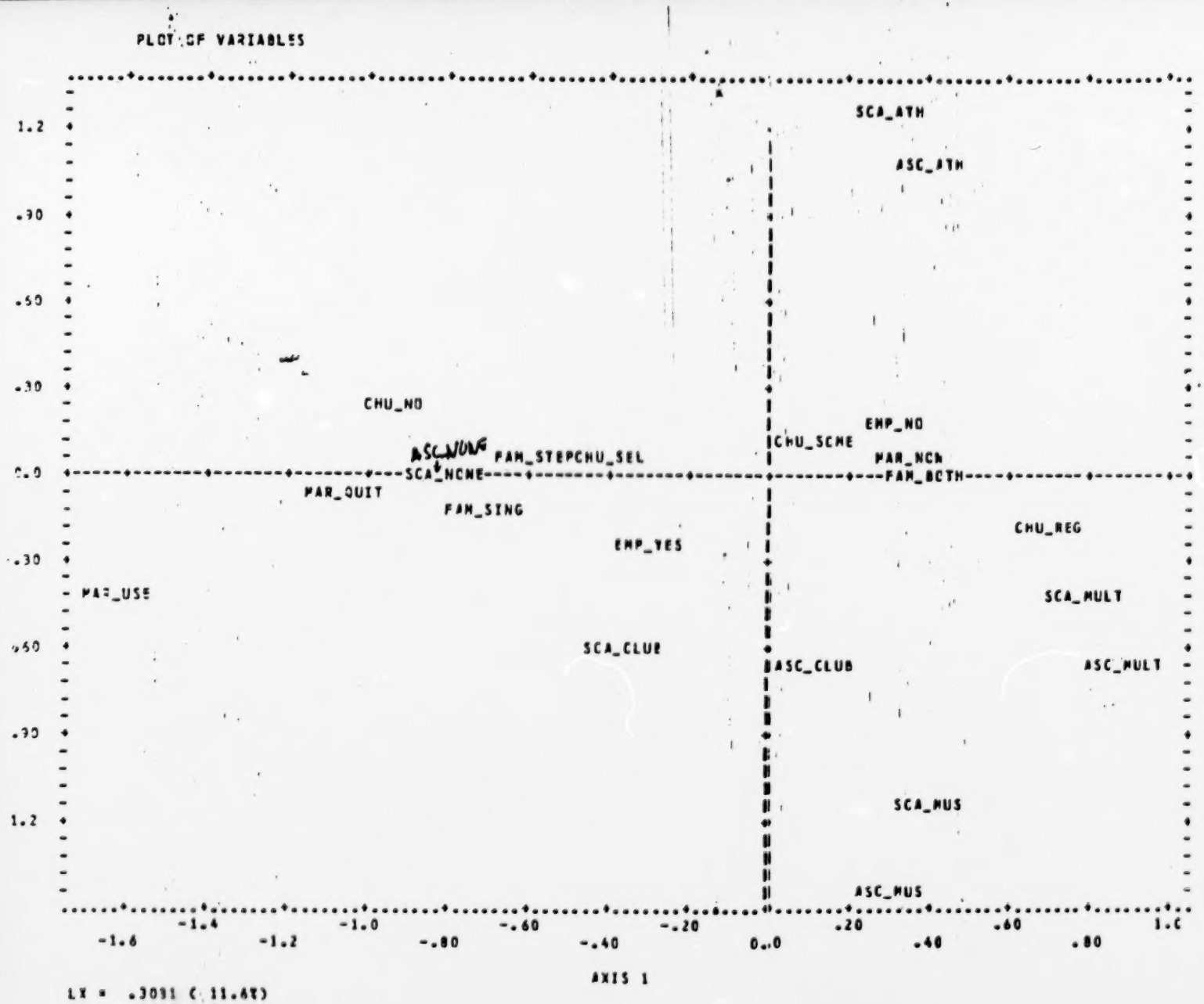


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Figure 7

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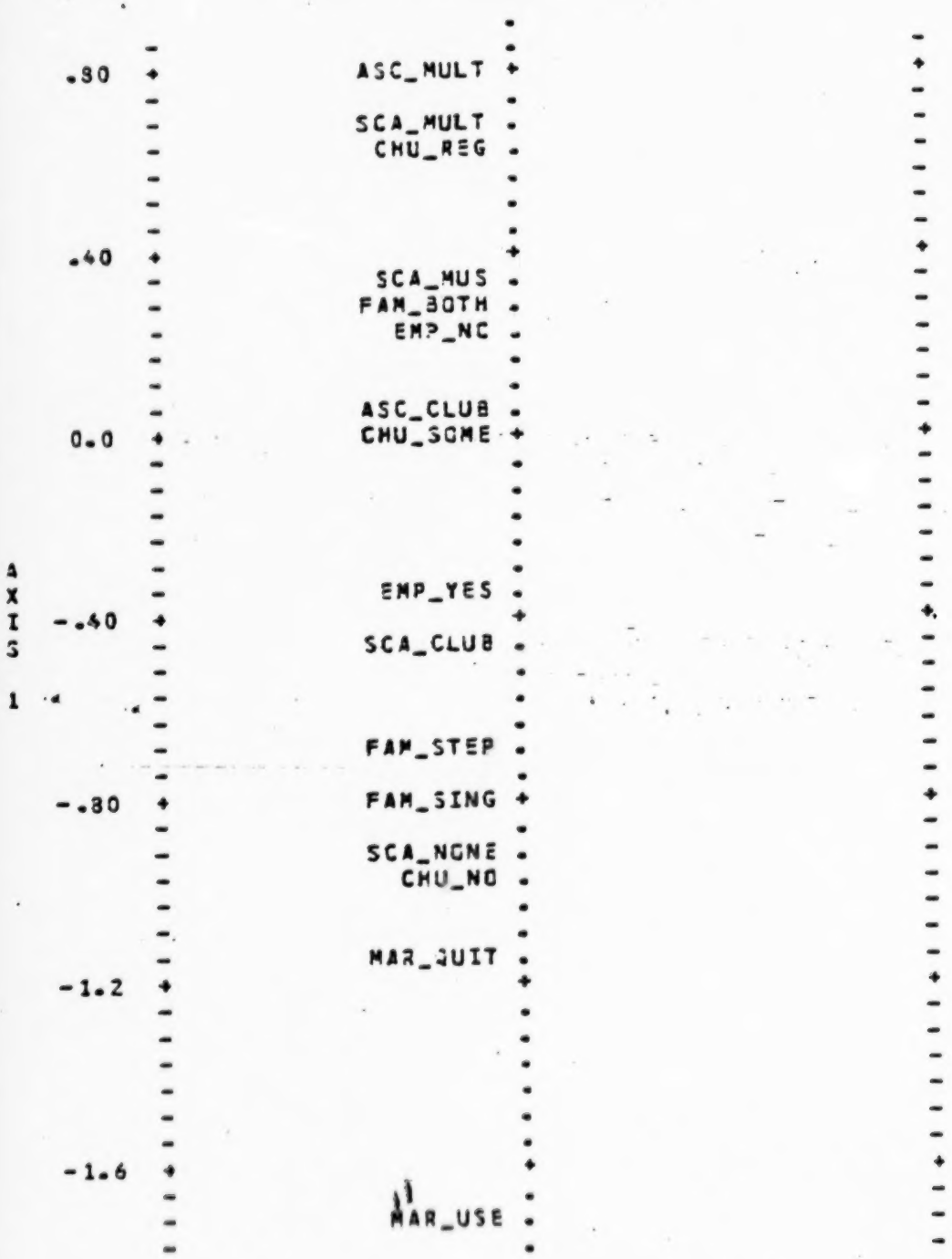
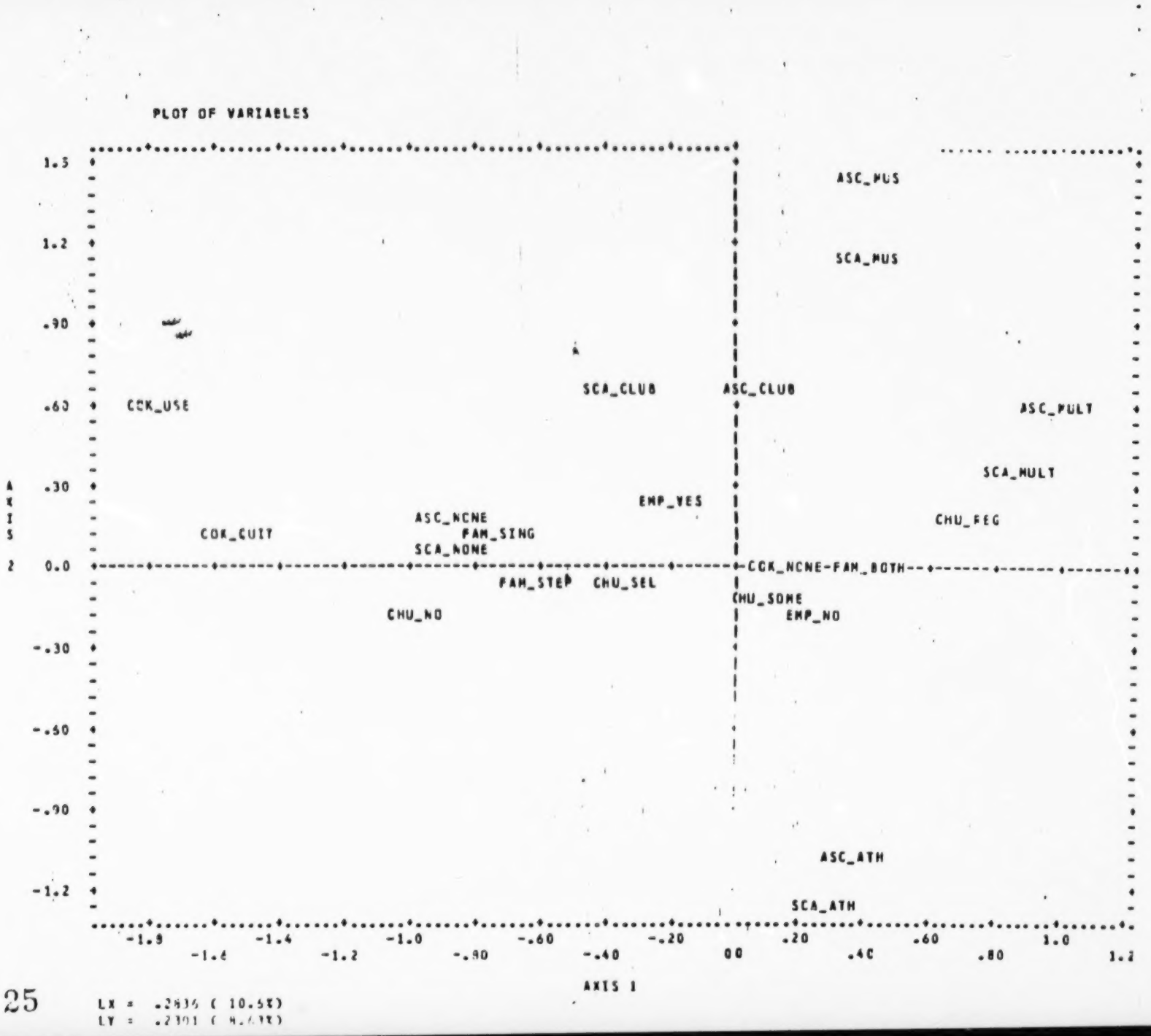
PLOT OF VARIABLES



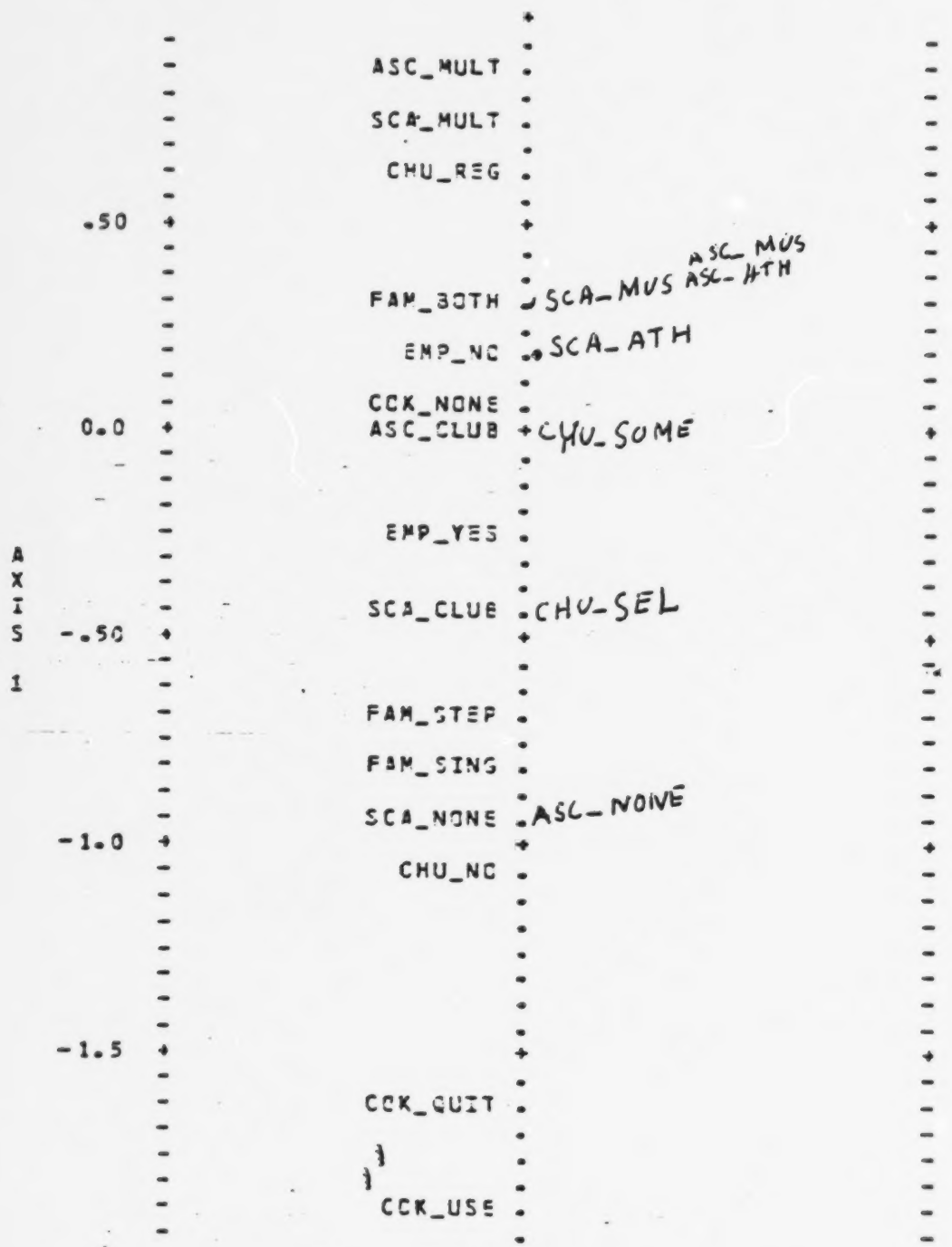
LX = .3081 (11.6%)

Figure 8



LX = .2834 (10.5%)
LY = .2301 (8.6%)

PLOT OF VARIABLES



LX = .2836 (10.6%)

Figure 10

Conclusions

This research supports the theory that there is a hierarchy of substance use from alcohol to tobacco, from tobacco to marijuana, and from marijuana to cocaine. While the clusters represent only tendencies toward use of a particular substance, it certainly appears that the students from a home environment with both parents present are least likely to be involved in substance use. These same students tend not to be employed either after school or on week-ends. Parental encouragement to participate in activities may preclude holding a job.

On the other end of the scale, the substance users tend to come from home environments where both parents are not present. There may not exist the encouragement in these home environments to participate in activities. If the student is working at a job after school, it takes the time that the student might use to participate in activities. The job also provides a source of income that may be spent on tobacco, alcohol, or illegal drugs.

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